

What is Claimed is:

1. A method for forming a capacitor of a semiconductor device, comprising the steps of:
 - 5 forming an etching barrier layer on an interlayer insulating film having a storage electrode contact plug therein, the etching barrier layer comprising a stacked structure of a nitride film and a tantalum oxide film;
forming an oxide film on the etching barrier layer;
 - 10 selectively etching the oxide film and the etching barrier layer to form an opening exposing the storage electrode contact plug;
depositing a storage electrode layer on the bottom and the inner walls of the opening; and
 - 15 removing the oxide film, whereby forming a storage electrode.
2. The method according to claim 1, wherein the nitride film is formed in a LPCVD or a PECVD process.
- 20 3. The method according to claim 2, wherein the LPCVD process is performed at a temperature ranging from 600 to 800°C using DCS and NH₃.

4. The method according to claim 2, wherein the LPCVD process is performed in a single chamber at a temperature ranging from 550 to 800°C using NH_3 and a gas selected from the group consisting of SiH_4 , Si_2H_6 and combinations thereof.

5. The method according to claim 2, wherein the PECVD process is performed by exciting plasma at a temperature lower than 600°C under an atmosphere of a mixture gas of (i) a gas selected from the group consisting of SiH_4 , Si_2H_6 and combinations thereof, and (ii) a gas selected from the group consisting of NH_3 , N_2 and combinations thereof.

6. The method according to claim 1, wherein the formation process of the tantalum oxide film comprises: (i) providing $\text{Ta}(\text{OC}_2\text{H}_5)_5$ as a source gas to an evaporator, (ii) evaporating the $\text{Ta}(\text{OC}_2\text{H}_5)_5$ at a temperature ranging from 120 to 200°C to create a Ta chemical vapor, and (iii) supplying the Ta chemical vapor and an oxygen gas as a reactive gas to a LPCVD chamber at amount of 10~1000sccm, respectively to be subject to surface reaction at a temperature ranging from 300 to 600°C to induce surface reaction.

7. The method according to claim 1, wherein the tantalum oxide film is formed in a LPCVD chamber using $\text{Ta}(\text{OC}_2\text{H}_5)_5$ as a source.

5 8. The method according to claim 1, wherein the etching barrier layer is formed by in-situ process in a multi-chamber having a tantalum oxide film chamber and a nitride film chamber.

10 9. The method according to claim 8, wherein the in-situ process is a PECVD or a LPCVD process.

15 10. The method according to claim 1, wherein the step of forming the etching barrier layer comprises: (i) depositing a nitride film in a PECVD process using a NH_3 gas and a gas selected from the group consisting of SiH_4 , Si_2H_6 and combinations thereof in a tantalum oxide film deposition chamber, and (ii) depositing a tantalum oxide film after a purge process.

20

11. A method for forming a capacitor of a semiconductor device, comprising the steps of:

forming an etching barrier layer on an interlayer insulating film having a storage electrode contact plug

therein, the etching barrier layer comprising a stacked structure of a nitride film and a tantalum oxide nitride (TaON) film;

forming an oxide film on the overall surface of the resultant structure;

selectively etching the oxide film and the etching barrier layer to form an opening exposing the storage electrode contact plug;

forming a storage electrode layer contacting the storage electrode contact plug on the bottom and the inner walls of the opening; and

removing the oxide film, whereby forming a storage electrode pattern.

12. The method according to claim 11, wherein the TaON film is formed using a Ta source gas and NH_3 source gas.